GRADUATE SCHOOL OF NUTRITION

1957–1958

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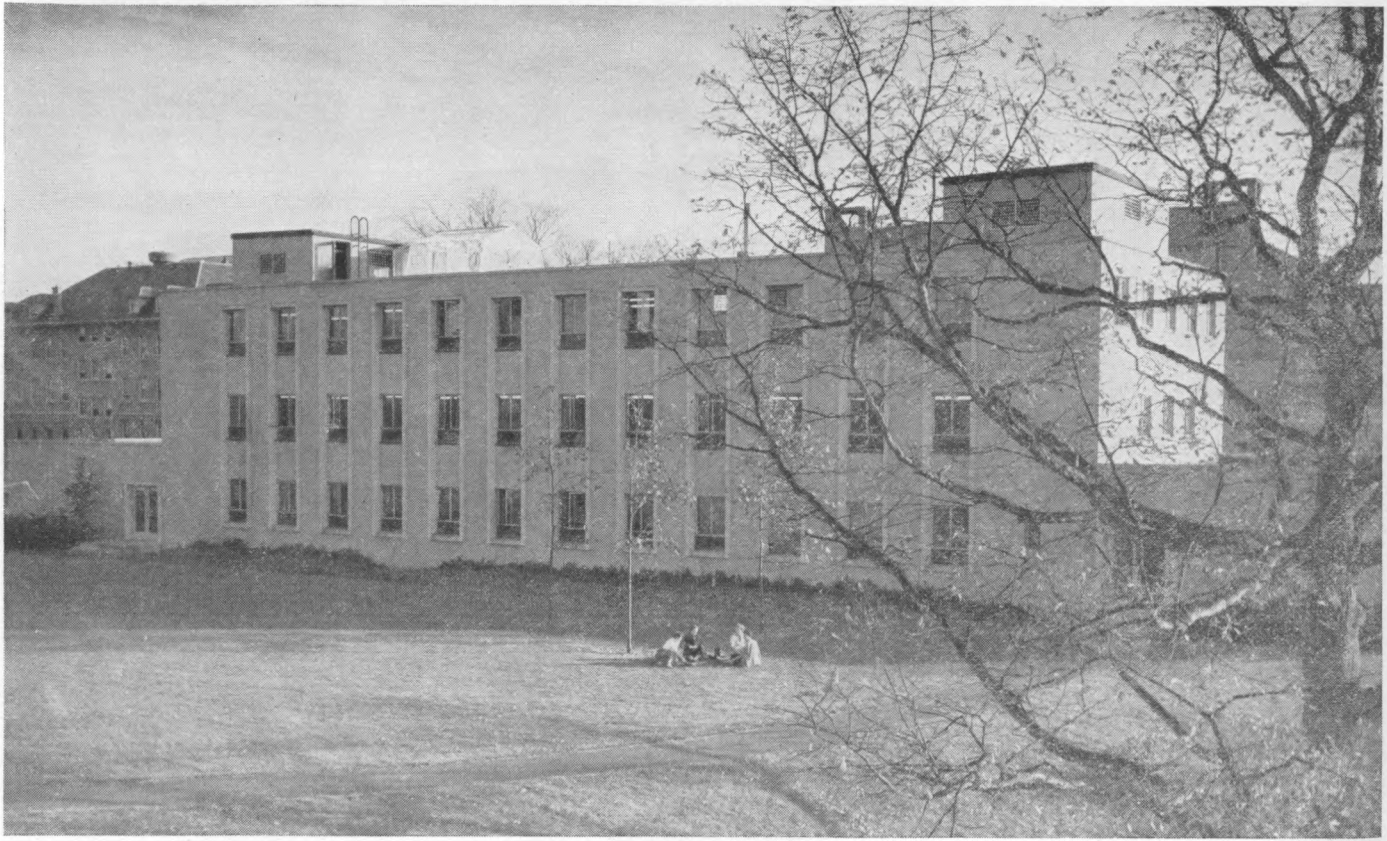

Savage Hall, the home of the Graduate School of Nutrition

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Charlotte M. Young, Ph.D., *Professor (Medical Nutrition)*

THE GRADUATE SCHOOL OF NUTRITION

THE GRADUATE SCHOOL OF NUTRITION was established at Cornell University to meet the enlarged and diversified needs of the many fields, both academic and industrial, in which a thorough knowledge of food and nutrition and their underlying sciences has become of importance. The program of the School offers an opportunity for the study of problems in food technology and economics and in food supply and distribution. Its curricula provide also for the training of research workers and teachers in nutrition, both human and animal, and for nutritionists in public health and institutional work.

COMMUNITY ORGANIZATION AND FACILITIES

The Graduate School of Nutrition is an organization in which the various colleges of the University are cooperating to provide an integrated program of research and teaching in food and nutrition. It is administered by a board consisting of the President, the Provost, the Deans of the Colleges of Agriculture, Arts and Sciences, Engineering, Home Economics, and the Medical College, and the Dean of the School. The School is supported by the endowed funds of the University, by an appropriation from the State University of New York, and by grants from various sources.

The School is housed in a modern building, equipped for teaching and research in the various aspects of food and nutrition. The facilities include biochemical, microbiological, and food laboratories, air-conditioned rooms for small-animal studies, and several laboratories equipped for other specific purposes. In addition, well equipped laboratories and other facilities are available in the cooperating colleges for studies of both human and animal nutrition and of the food supplies concerned. The Department of Clinical and Preventive Medicine of the University offers opportunity for studying the clinical aspects of nutrition. The United States Plant, Soil, and Nutrition Laboratory, established at Cornell in 1939, provides unusual opportunities for studying the relation of the production and processing of food crops to their nutritive value.

CURRICULUM AND DEGREES

The Graduate School of Nutrition offers a curriculum providing for specialization in either nutritional science or food science and leading to the degrees of Master of Nutritional Science or Master of Food Science. These degrees are awarded by the Graduate School of Cornell University, of which the Graduate School of Nutrition is a division.

ADMISSION

To be admitted to the School the applicant must hold a baccalaureate degree from a college or university of recognized standing or have done work equivalent to that required for such a degree. He must have a definite professional interest in the field of either nutritional science or food science. In order to qualify as a candidate for one of the graduate degrees, his training must include the completion, with a superior record, of courses in the following subjects, with the approximate number of semester hours as stated:

PHYSICAL SCIENCES—20 HOURS...(Chemistry, physics, mathematics.) Courses in quantitative chemistry and organic chemistry are prerequisites to courses required for graduation. If they are not offered for entrance, they must be taken following admission. Students who enter without training in physics are required to take an elementary course in this subject before graduation. Beginning courses in physics and chemistry, including organic and quantitative, cannot be counted toward graduation.

BIOLOGICAL SCIENCES—12 HOURS...(Biology, botany, zoology, bacteriology, physiology.) Courses in animal or human nutrition, or in food science up to three hours, may be counted in the biological sciences. Elementary courses in bacteriology or physiology cannot be counted toward graduation. An elementary course in bacteriology is a prerequisite to courses required for the degree of Master of Food Science.

SOCIAL STUDIES—9 HOURS...Suggested subjects are economics, government, education, psychology, sociology, anthropology, and history.

In addition, the applicant's record must show evidence that he has satisfactorily completed other courses which would be prerequisite to those he would need to take as a candidate for the degree for which he wishes to register. An applicant who cannot meet in full the specific course requirements listed above may be admitted if the faculty of the School so recommends after a consideration of his case, but with the understanding that the deficiencies must be made up before graduation.

Admission as noncandidates is open to applicants who desire to register for a term or more to take specific courses but who do not wish

to become candidates for a degree. Such applicants must hold Bachelors' degrees, must meet the other requirements specified for admission, and must show evidence that the courses desired will be of special benefit to them in their professional careers.

UNIVERSITY REQUIREMENTS

Students not previously registered at Cornell University must meet the general requirements for admission to the Graduate School as set forth in the Announcements of *General Information* and of the *Graduate School.*

Each entering student is expected to assume personal responsibility for the following health requirements adopted by the trustees of Cornell University. Permission to register for a new semester will not be granted unless all health requirements pertaining to the previous semester have been fulfilled.

IMMUNIZATION. A satisfactory certificate of immunization against smallpox, on the form supplied by the University, must be submitted before registration. It will be accepted as satisfactory only if it certifies that within the last three years a successful vaccination has been performed. If this requirement cannot be fulfilled by the student's home physician, opportunity for immunization will be offered by the Cornell medical staff during the student's first semester, with the cost to be borne by the student. If a student has been absent from the University for more than three years, immunity will be considered to have lapsed.

HEALTH HISTORY. Students accepted for admission will be required to submit health histories on forms supplied by the University.

X-RAY. Every student is required to have a chest X-ray. He may present a chest film, made by a private physician, on or before entering Cornell, provided that it was obtained within six months of initial registration and is of acceptable quality. Otherwise, he may obtain the chest X-ray at the University during the registration period or his first semester; in that case, the charge, covering also any necessary recheck films, will be included in the general University fee.

When a student has been away from the University for more than a year, the health history and X-ray requirements will need to be met again.

All students admitted to the Graduate School of Nutrition must register through the Graduate School Office, 125 Day Hall, at the beginning of each term or session.

Applicants for admission should address their inquiries to the Office of the Graduate School, Cornell University, Ithaca, N.Y. No application will be acted upon until all credentials enumerated in this form have been filed.

REQUIREMENTS FOR GRADUATION

Each student's program is carried out under the guidance of a faculty adviser. The requirements for graduation call for the completion of at least two units of residence. In addition, the student must have completed at least 36 semester hours of specified required courses of which not more than 10 can be in research (Graduate School of Nutrition 199). In the event that certain required courses have been completed satisfactorily by the student prior to his admission to the Graduate School, substitutions may be made with the approval of his adviser.

In order to round out the student's professional training in nutritional science or food science, certain elective courses will be required as deemed appropriate by the adviser and the faculty of the Graduate School of Nutrition. Finally, the student must prepare a written report on an approved problem that may or may not require laboratory research, and must pass a final examination. The curriculum differs in accordance with the field in which the student wishes to specialize, as follows:

A. NUTRITIONAL SCIENCE...The specialized training in this field, leading to the degree of Master of Nutritional Science, emphasizes the scientific knowledge and techniques underlying nutrition. The completion of the following curriculum is required:

	Hours		*Hours*
General Biochemistry	6	History of Nutrition	1
Principles of Nutrition	3	Seminars	1
Laboratory work in nutrition	3	Advanced course in human or animal nutrition	4
Advanced Physiology	6	Special problem	6 to 10
Food Economics	3		
Statistics (Biometry)	3		

In addition, the requirements include such approved electives as the faculty adviser and the faculty of the School may deem appropriate and necessary to round out the student's training in the field of nutritional science.

B. FOOD SCIENCE...The specialized training in this field, leading to the degree of Master of Food Science, emphasizes the sciences involved in food processing and utilization. The completion of the following curriculum is required:

	Hours		*Hours*
General Biochemistry	6	Statistics (Biometry)	3
Advanced Bacteriology	6	Advanced course in nutrition	3
Advanced course in foods	8	Seminars	1
Food Economics	3	Special problem	6 to 10

In addition, the requirements include such approved electives as the

faculty adviser and the faculty of the School may deem appropriate and necessary to round out the student's training in the field of food science.

SPECIAL PROBLEM...The work involved in the report on an individual problem, required for both degrees, may be carried out, with the approval of the student's faculty adviser, under the direction of any member of the faculty of the School whom the student may choose and who is willing to supervise it. The report must be approved by the supervising faculty member. The original copy of this report should be submitted to the Office of the Dean of the Graduate School of Nutrition, after approval by the faculty adviser, at least one week prior to the beginning of the final examination period. Directions concerning the form in which the report is to be presented may be obtained either from the student's faculty adviser or from the Office of the Dean of the Graduate School of Nutrition.

EXAMINATION...A final examination, either oral or written, or both, will be required for either degree. Examinations will be conducted by a committee consisting of the faculty adviser plus one other member to be designated by the faculty of the Graduate School of Nutrition or its delegated agent.

TRAINING FOR SPECIALIZED FIELDS

The provision for approved electives in the curricula for the two degrees enables the student, under the guidance of his faculty adviser, to prepare himself for one of several specialized fields in the general area in which the School operates. Students who wish to prepare themselves for teaching or research are given training in the principles governing the nutrition of all species, and they also have the opportunity, through an appropriate choice of electives, to learn how to apply these principles in either human or animal nutrition.

Special opportunities are provided for students of appropriate background who are interested in preparing themselves for work as community nutritionists with health and welfare agencies. Here, the approved electives will include certain phases of social science, the elements of public health, clinical and public health nutrition, and appropriate informational service techniques. Opportunities for supervised experiences with community and health agencies are available for selected students. Students accepted for training in this area must plan financially for three weeks of residence away from Cornell to cover the field experience. Two weeks will be in the fall just prior to the academic year; the third week may be either during the spring recess or immediately following final examinations. In addition, suitable students are urged to spend a two-months' period in the summer in "in-

service" training in nutrition as applied to the community and to public health. Help will be given in making the necessary contacts. These opportunities will provide assignments which can be used as the basis for meeting the requirement for a report on an individual problem.

Students who desire to prepare themselves for positions in the food industry will receive training in the sciences fundamental to work in food production and processing, quality control, and industrial research and development. The special training will emphasize biochemistry, bacteriology, and engineering and their applications in food processing and preservation. To round out the basic needs of the student for a professional career, opportunity will be provided for studies in economics, marketing, and business administration. It is also hoped that the student will gain practical experience in a food-processing establishment prior to the completion of his studies. Candidates for the Master of Food Science degree, if they so choose, have the special opportunity of conducting their individual problem work at the New York State Agricultural Experiment Station at Geneva, N.Y. Members of the Department of Food Science and Technology at this institution who are also members of the faculty of the Graduate School of Nutrition advise students in their special problem studies and help acquaint students with the diverse food science problems that are under investigation in these laboratories.

Students who desire to prepare for positions in the feed industry should have completed, prior to admission, reasonably broad training in livestock production, including poultry. They will receive in the School special training in the sciences that are fundamental to the work dealing with the formulation of rations for animals, the analysis of feedstuffs, and the conduct of experimental work. The training will stress principles of animal nutrition, experimental methods in animal nutrition, animal physiology, bacteriology, and analytical procedures. To round out the training of the student, courses in food economics, marketing, and business administration are provided. The student will be encouraged to obtain practical experience in a feed-manufacturing plant before completing his studies for the degree.

RESIDENCE REQUIREMENTS

No student who has not completed at least two terms of residence after receiving the Bachelor's degree from Cornell or elsewhere may receive a degree from the School. A student who holds a teaching or research assistantship involving a significant loss of time from his course work will not be given full residence credit. Assistants whose duties call for approximately twenty hours of work weekly will receive only three-fourths of residence credit a term. In other cases the amount of deduction will be determined by the faculty of the Graduate School of Nutrition or its delegated agent.

CREDIT FOR WORK DONE IN THE SUMMER...A student who is registered in the School may receive credit for work done in the University Summer Session if his program is approved in advance by his faculty adviser. To receive this credit he must also be registered in the Summer Session.

A student who has been registered in the School for one term after receiving his Bachelor's degree may, with the approval of his faculty adviser, register for a minimum of four and a maximum of twelve weeks for work on his individual problem under personal direction of a member of the faculty of the School and thus earn four to twelve weeks of residence credit. The student can thus make use of the summer period to meet, in whole or in part, the requirements of six to ten hours which are granted upon the completion of his report on an approved problem.

TUITION AND FEES

A registration deposit of $28 must be made by every applicant accepted for admission unless the candidate has previously matriculated as a student at Cornell University. A check or money order payable to Cornell University should be remitted to the Graduate School, 125 Day Hall, upon notification of acceptance by the Graduate School of Nutrition. This deposit is used to pay the matriculation fee, chest X-ray fee, and examination blank charge and covers certain expenses incident to graduation if the student receives a degree.

A tuition fee of $225 a term is to be paid by all students registered in the Graduate School of Nutrition. Students holding assistantships pay tuition in proportion to the residence credit received. Thus, assistants whose duties call for approximately twenty hours of work weekly will pay three-fourths of the tuition, or $168.75 a term.

A composite fee (College and University General Fee) of $87.50 a term is required of each registrant of the Graduate School of Nutrition whether he is receiving full residence credit or not. This fee covers the following services: administration, laboratory and library, health and infirmary, physical education and recreation, and student union.

Students of the Graduate School of Nutrition who attend classes in the Summer Session must register both in the Graduate School and in the Summer Session and pay the tuition and other fees required by the Summer Session.

A student working under personal direction in the Graduate School of Nutrition for twelve weeks (the maximum amount of residence credit which can be earned), or less, during the summer must pay a tuition fee proportionate to residence credit. He must also pay a composite fee of $87.50 for the twelve-week period, or one-half of this fee if registered for eight weeks or less.

Any tuition fee or other fee may be changed by the University Trustees to take effect at any time without previous notice.

GRADUATE ASSISTANTSHIPS, SCHOLARSHIPS, AND FELLOWSHIPS

GRADUATE ASSISTANTSHIPS... Graduate assistantships are available for a limited number of students in the Graduate School of Nutrition. These assistantships are established in order to provide the Graduate School of Nutrition with qualified technical personnel to aid in the various research programs, and at the same time to provide financial assistance to outstanding graduate students. The salary for an assistantship is at the rate of $2000 for ten months. The usual period runs from September 1 to June 30, although with certain research projects this term may be adjusted to either nine or twelve months, with appropriate salary adjustment.

Residence credit for holders of these graduate assistantships is limited to three-fourths of a unit each term, and the student must pay three-fourths of the Graduate School tuition, or $168.75 per term. In addition, the student must pay all fees required by the Graduate School.

Applications for graduate assistantships should be submitted directly to the Graduate School of Nutrition, Savage Hall, not later than March 1. Announcement of September appointments will be made on or about April 1.

FELLOWSHIPS AND SCHOLARSHIPS... In addition to the graduate assistantships, there are available to students in the Graduate School of Nutrition a limited number of tuition scholarships and fellowships. Application for these should be made directly to the Office of the Graduate School, 125 Edmund Ezra Day Hall, Cornell University, not later than February 14.

PUBLIC HEALTH TRAINEESHIPS FOR PUBLIC HEALTH PERSONNEL... Students interested in preparing for positions as public health nutritionists may apply for public health traineeship awards from the Public Health Service. Applicants for such individual traineeships may secure application forms and additional information from any of the Regional Medical Directors of the United States Public Health Service or from the Chief, Division of General Health Services, Bureau of State Services, Public Health Service, U.S. Department of Health, Education and Welfare, Washington 25, D.C.

ADVISORY SERVICE FOR STUDENTS PREPARING AT CORNELL TO ENTER THE SCHOOL

Students in the Colleges of Agriculture, Arts and Sciences, or Home Economics at Cornell University, who prepare for admission to the Graduate School of Nutrition, are advised during the period of preparation by members of the faculty of the School who are also members of the faculty of the college in which the students matriculate.

Undergraduates who are interested in nutrition and who are matriculating at Cornell University for the first time should state upon the application for admission that nutrition is the business or profession (field of work) in which they expect to enter, upon completion of their studies. This is necessary in order that appropriate faculty advisers may be assigned to them.

HEALTH SERVICES AND MEDICAL CARE

The health services and medical care of Cornell students are centered in the Gannett Medical Clinic (the out-patient department) and in the Cornell Infirmary (hospital). Students may consult a physician at the Clinic whenever need arises and receive treatment in cases that do not require hospitalization. If hospital care is indicated, the student is requested to enter the Infirmary. For details of the health and medical services covered by the student's College and University General Fee, see the *Announcement of General Information*. On a voluntary basis, insurance is available to supplement the services provided by the general fee; information about such insurance may be obtained at the Gannett Medical Clinic.

HOUSING

The University has established Cascadilla Hall as an all-graduate dormitory. The north wing is for graduate women and the south wing for graduate men. Applications for this dormitory may be made any time after January first for the coming academic year.

Room application forms and more detailed information on all types of graduate housing may be obtained by writing the Department of Residential Halls, Edmund Ezra Day Hall, Cornell University. The Off-Campus Housing Office is maintained by that Department to assist married students and those single students who do not wish to live in a University dormitory.

MILITARY SCIENCE AND TACTICS

The third and fourth years of military science and tactics (Advanced ROTC) are elective and qualify a student for appointment as a Second Lieutenant in the U.S. Army Reserve or the Regular Army. These courses are open to graduate students who have satisfactorily completed a basic course in ROTC while undergraduates and who are enrolled in a two-year graduate program leading to a degree. Interested graduate students should apply to the Professor of Military Science and Tactics, Barton Hall, for further information. See the *Announcement of Independent Divisions and Departments* for additional details and specific courses offered.

DESCRIPTION OF COURSES

The following list of courses includes both those previously specified as required for the degrees offered and some of those from which electives may be selected, with the approval of the student's faculty adviser, in accordance with his specific field of interest.

The information in parentheses following the name and the course refers to the college in which the course is given, the department, and the course number. In registering for any of these courses the information shown in the parentheses should be given rather than the name of the course. In some instances the time and place are not given in the descriptive material enclosed in the parentheses following the title of the course. To obain this information the student should consult the specific departmental office or the individual Announcements issued by the colleges concerned.

NUTRITION

PRINCIPLES OF ANIMAL NUTRITION. (Agriculture; Animal Husbandry 110.) Fall. Credit three hours. For seniors and graduate students. Prerequisite, a course in human or veterinary physiology and a course in organic chemistry or biochemistry. Lectures, M W F 10. Savage 100. Professor LOOSLI.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

LABORATORY WORK IN ANIMAL NUTRITION. (Agriculture; Animal Husbandry 111.) Fall or spring. Credit three hours. Prerequisite, quantitative analysis, Animal Husbandry 110 or its equivalent, and permission of the instructor. Class limited to 18 students each term. M W F 2–4:20. Stocking 160. Fall, Professor McCAY and assistants. Spring, Associate Professor WARNER and assistants.

Each student engages in a series of short research projects with experimental animals, such as rats, dogs, and sheep. Both classical and modern techniques of animal experimentation are taught. The application of biochemical methods to the solution of animal nutrition problems is included.

NUTRITION. (Home Economics; Food and Nutrition 230.) Spring. Credit three hours. Prerequisites, elementary college courses in nutrition, biochemistry, and human physiology (for Home Economics students: Food and Nutrition 103, Human Physiology 303, or Zoology 201, and Biochemistry 10; other students should see the instructor about equivalent preparation). Discussion, T Th 8. Van Rensselaer 339. Laboratory, F 2–4 or S 9–11, Van Rensselaer 426. Professor HAUCK and Assistant Professor NEWMAN.

Principles of nutrition as they relate to energy metabolism and weight control, hygiene of the digestive tract, proteins, minerals, and vitamins. Application of the principles of nutrition to needs of normal individuals. During and as a result of this course the student is expected to establish and maintain good nutrition practices.

MATERNAL AND CHILD NUTRITION. (Home Economics; Food and Nutrition 340.) Fall or spring. Credit two hours. Prerequisite, Food and Nutrition 103 or 190.

Not open to students who have taken Food and Nutrition 230. Majors in the department may elect this course as sophomores. Nonmajors must have junior or senior standing. Lecture and discussion. W F 8. Van Rensselaer 339. Assistant Professor NEWMAN.

Family nutrition with special emphasis upon the nutritional needs of the mother and child. Relation of nutrition to physical growth and development.

NUTRITION OF GROWTH AND DEVELOPMENT. (Home Economics; Food and Nutrition 440.) Fall. Credit two hours. Prerequisite, Food and Nutrition 230 or equivalent. T Th 9. Van Rensselaer 301. Assistant Professor NEWMAN.

Relation of nutrition to growth and development from the prenatal period to adulthood. A study of research literature.

HISTORY OF NUTRITION. (Agriculture; Animal Husbandry 215.) Fall. Credit one hour. Th 4:15. Savage 130. Professor McCAY.

The purpose of the course is to familiarize the student with the background literature in nutrition and to improve his technique in using the libraries. Each student prepares four written reports and summarizes these in brief oral reports to learn better ways to present technical information.

SPECIAL TOPICS IN BIOCHEMISTRY AND NUTRITION. (Agriculture; Biochemistry and Nutrition 220.) Spring. Credit one hour. Primarily for graduate students. Prerequisite, a course in biochemistry and a course in nutrition. Registration by permission. T 8. Savage 145. Professor WILLIAMS.

ADVANCED POULTRY NUTRITION. (Agriculture; Poultry Husbandry 210.) Spring. Credit two hours. For graduate students. Not given every year and not unless ten or more students apply for the course. Registration by appointment. Discussion and laboratory period. Th 2–4. Rice 201. Professors NORRIS and SCOTT.

A presentation of one or more important fields of research in poultry nutrition, a critical consideration of the experimental methods used in conducting the investigations, and discussion of further studies needed, including the planning of the experiments.

READINGS IN NUTRITION. (Home Economics; Food and Nutrition 400.) Spring. Credit two hours. Offered in alternate years. Prerequisite, Food and Nutrition 230 or equivalent. T Th 11. Van Rensselaer 301. Professor HAUCK.

Critical review of literature in the field of vitamin and mineral metabolism, with emphasis on the experimental data on which the principles of human nutrition are based.

[*READINGS IN NUTRITION.* (Home Economics; Food and Nutrition 401.) Spring. Credit two hours. Offered in alternate years. Prerequisite, Food and Nutrition 230 or equivalent. T Th 11. Van Rensselaer 301. Professor HAUCK.

Critical review of literature relating to energy metabolism, proteins, fats, and carbohydrates, with emphasis on the experimental data on which the principles of human nutrition are based. Not offered in 1957–1958.]

SEMINAR IN ANIMAL NUTRITION. (Agriculture; Animal Husbandry 219.) Fall. Credit one hour. Open to graduate students with major field of study in animal nutrition. Registration by permission. T 4:30. Wing E. Animal Nutrition staff.

A critical review of the literature and other topics of special interest to graduate students in animal nutrition.

NUTRITION SEMINAR. (Agriculture; Biochemistry and Nutrition 292.) Spring. Credit one hour. Registration by permission. M 4:15. Savage 100. Staff.

Assignments and discussions of recent advances in the biochemistry and physiology of nutrition.

SEMINAR IN NUTRITION. (Home Economics; Food and Nutrition 420.) Fall. Credit one hour. T 4:30. Van Rensselaer 301. Assistant Professor NEWMAN and department staff.

CLINICAL AND PUBLIC HEALTH NUTRITION. (Clinical and Preventive Medicine 392.) Spring. Credit three hours. Prerequisites, a course in nutrition, in physiology, and in biochemistry. Registration by permission of the instructor. For Graduate School of Nutrition and Graduate School students only. M W F 10. Savage 145. Professor YOUNG and members of the medical staff.

This course is designed to familiarize the student with some of the applications of nutrition to clinical and public health problems.

FIELD OBSERVATION AND EXPERIENCE IN COMMUNITY NUTRITION. (Clinical and Preventive Medicine 381–382.) Throughout the year. Credit one hour (a term). Prerequisites (or in conjunction with) CPM 392 and Engineering 2509. Registration by permission only. For Graduate School of Nutrition and Graduate School students only. A two-week full-time field period just prior to the academic year and one week during the spring recess or immediately following final examinations in the spring term. Time and place as arranged. Visiting Assistant Professor EGAN and Professor YOUNG.

Supervised observation and experience in community nutrition programs. Students must be prepared to defray expense of living costs in the communities selected for the field experience. Every effort will be made to keep costs minimal.

DIET THERAPY. (Home Economics; Food and Nutrition 330.) Fall. Credit three hours. Prerequisite, Food and Nutrition 230 or equivalent. Discussion, M W F 9. Van Rensselaer 426. Professor HAUCK.

Diet in diseases such as fever, gastrointestinal disturbances, and diabetes. Experience in indepedent use of journal literature in this field.

NUTRITION AND HEALTH. (Home Economics; Food and Nutrition 190.) Fall. Credit two hours. Intended for students who have had no previous college course in human nutrition. Not to be elected by students who take Food and Nutrition 103 or 104. T Th 9. Van Rensselaer 426. Professor HAUCK.

The relationship of food to the maintenance of health; its importance to the individual and society.

PUBLIC HEALTH

PUBLIC HEALTH AND COMMUNITY SANITATION. (Engineering 2509.) Spring. Credit three hours. Three recitation periods a week.

A general course outlining principles of communicable disease control; organization of health departments; environmental sanitation, water supply, waste disposal, milk, food sanitation; insect and rodent control; industrial hygiene; vital statistics. Course adjusted to the needs of the students enrolled.

FOOD PROCESSING

PRINCIPLES OF FOOD TECHNOLOGY. (Agriculture; Food Science and Technology 101.) Throughout the year. Credit three hours a term. Prerequisite, Chemistry 102 or 106, Bacteriology 1, Physics 104. Fall term, T Th 10, Riley-Robb 205. Laboratory, F 2–4:30, Riley-Robb 44. Spring term, M W 11, Riley-Robb 225. Laboratory, Th 2–4:30, Riley-Robb 44. Associate Professor NEBESKY.

Outlines the broad field of food economics, the processing, production, and distribution of raw material to finished product, with emphasis on canning, freezing, and dehydration. The fundamental chemical and physical properties of foods, and their nutritive components, food additives and preservatives, and the principles of manufacture are discussed. Laboratory practice involves actual processing and preservation of various food products.

SELECTED TOPICS IN FOOD BIOCHEMISTRY. (Agriculture; Biochemistry and Nutrition 140.) Spring. Credit two hours. Prerequisite, Biochemistry and Nutrition 101. Lectures, M W 10. Savage 145. Professor WILLIAMS and staff members from the Department of Food Science and Technology, N.Y. State Agricultural Experiment Station, Geneva, N.Y.

A discussion of some of the important nonmicrobial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes as they affect the color, odor, flavor, texture, or nutritive value of foods.

FOOD BIOCHEMISTRY SEMINAR. (Agriculture; Biochemistry and Nutrition 294.) Fall. Credit one hour. Registration by permission. F 4:30. Savage 130. Professor BARNES and staff members from the Department of Food Science and Technology, N.Y. State Agricultural Experiment Station, Geneva, N.Y.

Assignments and discussions of literature pertaining to the biochemical aspects of foods and food processing.

DAIRY AND FOOD ENGINEERING. (Agriculture; Dairy Industry 130.) Fall. Credit four or five hours. Prerequisite, Physics 103 and 104 and introductory course in food science. Lectures, M W F 10. Laboratory, M W 2–4:30. Recitation to be arranged. Stocking 119. Associate Professor JORDAN and Mr. HOEFER.

Engineering aspects of dairy and food plant operations, and a study of forms and records used in inventory control.

ELEMENTARY CHEMICAL ENGINEERING. (Engineering 5110.) Spring. Credit three hours. Primarily for students in agriculture or nutrition. Not open to students in chemical engineering. Lectures, M W 10, F 8. Olin 158. Associate Professor FINN.

A general discussion of the fundamental operations and processes of chemical engineering, with particular emphasis on their applications in the food-processing industries. Among the topics discussed are the unit operations of evaporation, filtration, agitation, distillation, and drying, and the general design of food-processing plants.

ANALYTICAL METHODS. (Agriculture; Dairy Industry 111.) Spring. Credit four hours. Prerequisite, quantitative analysis. Lectures, T Th 11. Laboratory practice, T 1–5. Stocking 119. Professor HERRINGTON and assistant.

A study of the more important operations and apparatus used in quantitative analysis, and their practical application.

CHEMISTRY OF MILK. (Agriculture; Dairy Industry 113.) Fall. Credit two hours. Prerequisite, qualitative and quantitative analysis and organic chemistry. Lectures, M W 8. Stocking 120. Professor HERRINGTON and Associate Professor SHIPE.

The subject matter changes from year to year. It may deal with colloidal phenomena in milk and its products. It may deal with the enzymes of milk, with milk proteins, with milk fat, or with chemical reactions and equilibria in dairy products. Graduate students may re-register in successive years and find little duplication of material.

MILK-PRODUCTS MANUFACTURING. (Agriculture; Dairy Industry 103.) Fall. Credit five hours. Prerequisite, Dairy Industry 1, Bacteriology 1, and organic chemistry or biochemistry. T Th 11–4:30. Stocking 120. Professor KOSIKOWSKI and assistant.

The principles and practice of making butter, cheese, and casein, including a study of the physical, chemical, and biological factors involved. Consideration is given also to commercial operations and dairy-plant management.

MILK-PRODUCTS MANUFACTURING. (Agriculture; Dairy Industry 104.) Spring. Credit five hours. Prerequisite, Dairy Industry 102. T Th 11–4:30. Stocking 119. Associate Professor JORDAN and assistant.

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved.

POSTHARVEST PHYSIOLOGY, HANDLING, AND STORAGE OF FRUITS. (Agriculture; Pomology 111). Fall. Credit three hours. Prerequisite, Pomology 1 or 2. Lectures, T Th 8, Plant Science 143. Laboratory, Th or F 2–4:30, Plant Science 107. Professor SMOCK.

The chemistry and physiology of fruits as they affect quality and marketability are studied. Handling methods, maturity indices, and storage practices are considered. Practical work involves grading and inspection of fruits and storage of fruit in different ways. One Saturday field trip is required.

HANDLING VEGETABLE CROPS, ADVANCED COURSE. (Agriculture; Vegetable Crops 112.) Fall. Credit four hours. Primarily for graduate students and those undergraduates who are specializing in marketing. Lectures, T Th 11, East Roberts 222. Laboratory, T or W 2–4:30, East Roberts 223. One-hour conference period, to be arranged. Professor HARTMAN.

Students registered for the Tuesday laboratory are scheduled to go on a field trip at 9:30 a.m., Wednesday, September 18.

This course has the same lectures, laboratories, and field trips as Vegetable Crops 12. Much more outside reading of research publications in the field is required in Vegetable Crops 112 than in Vegetable Crops 12, and different examinations are given for the two courses.

RESEARCH METHODS IN VEGETABLE CROPS. (Agriculture; Vegetable Crops 225.) Spring. Credit four hours. Primarily for graduate students. Prerequisite, Vegetable Crops 101. It is recommended that Botany 231 and 232 precede or accompany this course. Lectures, M W F 9. Laboratory, M 2–4:30. East Roberts 223. Professor KELLY and Assistant Professor OYER.

A study of research techniques peculiar to vegetable crops, with a study of the literature and the solution of research problems.

VEGETABLE CROPS, ADVANCED COURSE. (Agriculture; Vegetable Crops 101.) Fall. Credit four hours. Prerequisite, Vegetable Crops 11 and Botany 31. Lectures, M W F 11. Laboratory, M 2–4:30. East Roberts 223. Professor KELLY.

Devoted to a systematic study of the literature dealing with practices in vegetable production. Results of experiments that have been conducted or are being conduced are studied, and their application to the solution of practical problems is discussed.

FOOD PREPARATION

SCIENCE IN FOOD PREPARATION. (Home Economics; Food and Nutrition 314.) Fall. Credit three hours. Prerequisite, Food and Nutrition 215 or 225 and Biochemistry 10. Lecture T Th 8, Van Rensselaer 339. Laboratory S 9–11, Van Rensselaer 356 and 358. Professor PERSONIUS.

Scientific principles underlying modern theory and practice in the preparation of batters, doughs, and starch-thickened products, and in egg and milk cookery. The relation to food preparation of the physical and chemical properties of fats, proteins, starches and leavening agents; colloidal systems—gels, sols, foams, and emulsions. Laboratory studies of effect of varying ingredients, manipulation, and cooking conditions on quality of the product.

SCIENCE IN FOOD PREPARATION, INTRODUCTORY EXPERIMENTAL COOKERY. (Home Economics; Food and Nutrition 315.) Spring. Credit three hours. Prerequisite, Food and Nutrition 314, or equivalent. Lecture, T Th 9, Van Rensselaer 339. Laboratory, F 10–1, Van Rensselaer 356. Professor FENTON.

Continuation of Food and Nutrition 314 with emphasis on meat, fruit, vegetable, and sugar cookery, and frozen desserts. The relation to food preparation of the physical and chemical properties of sugars, fruit and vegetable pigments and flavor constituents; properties of true solutions—solubility, boiling and freezing point, crystallization, palatability and retention of nutrients. Study of methods and techniques used in experimental work with food. Laboratories during the latter half of the semester will be devoted to independent work on a problem in food preparation.

FOOD DEMONSTRATION. (Home Economics; Food and Nutrition 305.) Throughout the year. Credit one hour. Limited to 10 students. Prerequisite, Food and Nutrition 215 or 225. T Th 2:30–4. Van Rensselaer 352. Assistant Professor SNOW.

Emphasis on the purposes and techniques of demonstrations in relation to food preparation and nutrition, with application to teaching, extension, business, and social service.

SEMINAR IN FOOD. (Home Economics; Food and Nutrition 421.) Spring. Credit one hour. T 4:30. Van Rensselaer 301. Assistant Professor SNOW and department staff.

BACTERIOLOGY

DAIRY BACTERIOLOGY. (Agriculture; Bacteriology 101.) Spring. Credit three hours. Prerequisite, Bacteriology 1. Lectures, T Th 9, Stocking 119. Laboratory, T Th 10–12, Stocking 321. Professor NAYLOR and assistant.

A study of the microorganisms of importance in milk and milk products, with laboratory practice in the use of standard methods for microbiological testing and control of dairy products.

ADVANCED BACTERIOLOGY. (Agriculture; Bacteriology 103.) Spring. Credit six hours. Prerequisite, Bacteriology 1 and organic chemistry. Lectures and laboratory practice. M W F 2–5:30. Stocking 119. Professor SEELEY and assistants.

A systematic study of certain important groups of bacteria, together with advanced cultural and isolation procedures, and other specialized techniques.

HIGHER BACTERIA AND RELATED MICROORGANISMS. (Agriculture; Bacteriology 105.) Fall. Credit four hours. Prerequisite, Bacteriology 1. Lectures, recitations, and laboratory practice, T Th 1:40–5. Stocking 119 and 321. Professor KNAYSI and assistant.

A study of the higher bacteria, together with the yeast and molds that are of especial importance to the bacteriologist.

PHYSIOLOGY OF BACTERIA. (Agriculture; Bacteriology 210.) Fall. Credit two hours. Prerequisite, Bacteriology 1 and at least one additional course in bacteriology and one in organic chemistry. Lectures, T Th 10. Stocking 120. Professor DELWICHE.

The physiology of bacteria and the biochemistry of microbic processes.

MORPHOLOGY AND CYTOLOGY OF BACTERIA. (Agriculture; Bacteriology 213.) Fall. Credit three hours. For seniors and graduate students. Lectures, T Th S 9. Stocking 120. Professor KNAYSI.

The morphology, cytology, and microchemistry of microorganisms.

CHEMISTRY OF BACTERIAL PROCESSES. (Agriculture; Bacteriology 215.) Spring. Credit two hours. For seniors and graduate students. Lectures, M W 11. Stocking 119. Professor DELWICHE.

The chemistry of metabolism, fermentation, and nutrition of microorganisms.

BIOCHEMISTRY

GENERAL BIOCHEMISTRY, LECTURE. (Agriculture; Biochemistry and Nutrition 101.) Fall. Credit four hours. Prerequisite, organic chemistry. Lectures M W F S 8. Savage 100. Professor WILLIAMS.

For graduate and advanced undergraduate students, dealing with the chemistry of plant and animal substances and the reactions occurring in biological systems.

GENERAL BIOCHEMISTRY, LABORATORY. (Agriculture; Biochemistry and Nutrition 102.) Fall. Credit two hours. Prerequisite or parallel, Biochemistry and Nutrition 101, quantitative analysis. Laboratory, M W or T Th 2–4:20. Savage 230. Professor WILLIAMS and assistants.

Laboratory practice with plant and animal materials and the experimental study of their properties.

PHYSICAL ASPECTS OF BIOCHEMISTRY. (Agriculture; Biochemistry and Nutrition 110.) Fall. Credit two hours. Prerequisites, nine semester hours of college chemistry and introductory college physics or the equivalent. Intended for advanced undergraduates and graduate students in the biological sciences. Lectures, T Th 9, and an occasional hour by arrangement. Savage 145. Assistant Professor HESS.

A discussion of certain fundamental principles relating to matter and energy, properties of gases, liquids, and solutions, and chemical equilibrium which are helpful to an understanding of biological phenomena.

[*BIOCHEMISTRY AND NUTRITION OF THE VITAMINS.* (Agriculture; Biochemistry and Nutrition 150.) Spring. Credit two hours. Offered in alternate years. Prerequisite, Chemistry 303 and 305 or the equivalent, Biochemistry and Nutrition 101 or the equivalent, or Biochemistry and Nutrition 5 or 10 by permission. Primarily for graduate students. Associate Professor DANIEL.

The chemical, physiological, and nutritional aspects of the vitamins. Not offered in 1957–1958.]

BIOGENESIS OF BIOLOGICALLY ACTIVE COMPOUNDS. (Agriculture; Biochemistry and Nutrition 160.) Fall. Credit two hours. Offered in alternate years. Prerequisite, Biochemistry and Nutrition 101 or the equivalent. Primarily for graduate students. Lectures, M W 9. Savage 145. Professor WRIGHT.

A consideration of the metabolic pathways by which certain structural and functional compounds of the cell originate.

BIOCHEMISTRY OF LIPIDS AND CARBOHYDRATES. (Agriculture; Biochemistry and Nutrition 201.) Spring. Credit two hours. Prerequisites, Biochemistry and Nutrition 101 and 102, and introductory physical chemistry or the equivalent. Lectures, M W 9. Savage 100. Professor NELSON.

Discussion of the properties and biological role of the lipids and carbohydrates.

BIOCHEMISTRY OF PROTEINS AND ENZYMES. (Agriculture; Biochemistry and Nutrition 202.) Spring. Credit two hours. Prerequisites, Biochemistry and Nutrition 101 and 102 and introductory physical chemistry or the equivalent. Lectures, T Th 9. Savage 100. Assistant Professor HESS.

A discussion of the chemical and biological aspects of proteins and enzymes.

ADVANCED BIOCHEMISTRY. Laboratory. (Agriculture; Biochemistry and Nutrition 203.) Spring. Credit three hours. Prerequisite, to accompany or follow Biochemistry and Nutrition 201 and 202. Limited enrollment. Registration by permission of the instructor only. M W 2–5. Savage 230. Professor NELSON and assistants.

Laboratory experiments dealing with enzymes, cofactors, and substrates of importance in metabolic processes. Practice is given in the use of special techniques employed in isolation, characterization, and mode of action of enzymes and enzyme systems. Emphasis is placed on interpretation of data and written reports covering the various experiments.

RADIOACTIVE ISOTOPE TECHNIQUES IN BIOCHEMISTRY. Laboratory. (Agriculture; Biochemistry and Nutrition 204.) Spring. Credit three hours. Prerequisite, permission of the instructor. Enrollment limited. T Th 2–5. Savage 210. Associate Professor GIBBS.

Laboratory exercises in the use of radioactive isotopes in the study of intermediary metabolism.

PLANT INTERMEDIARY METABOLISM. (Agriculture; Biochemistry and Nutrition 211.) Spring. Credit three hours. Prerequisite, Biochemistry and Nutrition 101, 102, and elementary physical chemistry, or the equivalent. Lectures, M W F 9. Savage 145. Associate Professor GIBBS.

An advanced course in intermediary metabolism. The following topics will be discussed, although emphasis will vary each year: photosynthesis, pathways of carbohydrate metabolism, organic acid metabolism, nitrogen fixation and the biosynthesis of secondary products. The student will be expected to do periodical reading.

BIOCHEMISTRY SEMINAR. (Agriculture; Biochemistry and Nutrition 290.) Fall or spring. Credit one hour. Registration by permission. Fall, M 4:15; spring, Th 12. Savage 100. Staff.

Assignments and discussions of recent advances in biochemistry.

CHEMISTRY AND PHYSICS

[*CHEMISTRY OF NATURAL PRODUCTS.* (Arts and Sciences; Chemistry 395–396.) Throughout the year. Credit two hours (a term). Offered in alternate years. Prerequisite, Chemistry 320 and 365–366. Primarily for graduate students. Open to undergraduates by consent of the instructor. Students may register for either term separately. Lectures, T Th 9. Assistant Professor PHILLIPS.

Fall: alkaloids, terpenes, antibiotics, and plant pigments. Spring: proteins, carbohydrates, vitamins, and steroids. Not offered in 1957–1958.]

INTRODUCTORY PHYSICAL CHEMISTRY. (Arts and Sciences; Chemistry 403–404.) Throughout the year. Credit three hours (a term). Prerequisites, Chemistry 224 and 308, Mathematics 163, 183 or 193, and Physics 118. Chemistry 403 is prerequisite to Chemistry 404. Required of candidates for the degree of B.Ch.E. Lectures, M W F 9. Associate Professor SCHERAGA.

A systematic treatment of the fundamental principles of physical chemistry. The laws of thermodynamics and of the kinetic theory are applied in a study of the properties of gases, liquids, and solids, thermochemistry, properties of solutions, and equilibrium in homogeneous and heterogeneous systems. Chemical kinetics and atomic and molecular structure are also studied.

INTRODUCTORY PHYSICAL LABORATORY. (Arts and Sciences 411–412.) Throughout the year. Credit two hours (a term). Prerequisite or parallel course, Chemistry 403–404 or Chemistry 407–408. Chemistry 411 is prerequisite to Chemistry 412. Enrollment may be limited. Required of candidates for the degrees of B.Ch.E. and A.B. with a major in chemistry. Laboratory, M T or Th F 2–4:30. Professor HOARD, Associate Professor SCHERAGA, Assistant Professor WIDOM and assistants.

Quantitative experiments illustrating the principles of physical chemistry, and practice in performing typical physicochemical measurements. A part of the scheduled time is used for the discussion of experiments rather than for laboratory work.

[*COLLOID CHEMISTRY.* (Arts and Sciences; Chemistry 440.) Spring. Credit two hours. Offered in alternate years. Prerequisite, Chemistry 404 or 408. Lectures, T Th 11 and occasionally S 11. Associate Professor SCHERAGA.

Physical chemistry of surfaces and colloids, including intermolecular forces, thermodynamic and electrical properties of interfaces, electrokinetic phenomena, interaction between colloidal particles, stability of lyophobic colloids, and properties of colloidal solutions. Not offered in 1957–1958.]

PHYSICS FOR STUDENTS OF BIOLOGY. (Arts and Sciences; Physics 200.) Fall or spring. Credit three hours. Prerequisites, six semester hours of college work in each of the following: physics, chemistry, and biological science. Students having grades below 70 in Physics 103 and 104 should not elect this course. Lectures, T Th 12. Laboratory, T or F 2–4. Professor BARNES.

Lectures and laboratory experiments dealing with such topics in molecular physics, electricity and magnetism, electromagnetic radiation, and nuclear physics as are related to the study of biology.

ECONOMICS

FOOD ECONOMICS. (Agriculture; Agricultural Economics 159.) Spring. Credit three hours. Designed especially for students in the Graduate School of Nutrition and in the College of Home Economics. Not open to students in the College of Agriculture except by permission of the instructor. Lectures and discussion, M W F 8. Savage 100. Professor DEGRAFF.

Economic aspects of food, including production, distribution, and consumption, with special emphasis on the economics of diet.

MARKETING. (Agriculture; Agricultural Economics 140.) Fall or spring. Credit three hours. Lectures: fall, M W F 10; spring, M W F 11 except for weeks when field trips are taken, then M F lectures only. Warren 45. Field trips, T W or Th 1:30–5:30. Professor DARRAH.

A study of how farm products are marketed. Special attention is given to the consumption of farm products, the factors that affect consumption, production areas, market channels, the operation of different marketing agencies, marketing services, and costs. One all-day and five half-day trips are taken to visit marketing agencies.

SEMINAR IN AGRICULTURAL GEOGRAPHY. (Agriculture; Agricultural Economics 250.) Spring. Credit two hours. Open only to graduate students. Registration by permission. W 7:30 p.m. Savage 130. Professor DEGRAFF.

Consideration of basic problems of comparative agriculture and of population and the food supply. Specific topics vary from year to year.

SURVEY OF INDUSTRIAL AND LABOR RELATIONS. (Industrial and Labor Relations 293.) Fall or spring. Credit three hours. Fall, M W F 12. Associate Professor CARPENTER. Not open to ILR students.

A survey for students in other divisions of the University. Includes an analysis of the major problems in industrial and labor relations; labor union history organization, and operation; labor market analysis and employment practices; industrial and labor legislation and social security; personnel management and human relations in industry; collective bargaining; mediation and arbitration; the rights and responsibilities of employers and employees; the major governmental agencies concerned with industrial and labor relations.

INSTITUTION ADMINISTRATION: PLANNING OF EQUIPMENT AND LAYOUT. (Home Economics; Institution Management 320.) Fall. Credit three hours. Primarily for seniors. Advised for all students specializing in institution management or dietetics. Prerequisites, Institution Management 230 and Accounting 240. Hotel Administration 119 or Industrial and Labor Relations 461 is recommended to precede or parallel this course. M 2–4, F 2. Van Rensselaer 124. Professor BLOETJES.

Analysis and interpretation of major administrative problems such as the operational plan of a food service organization, policies underlying the plan, financial management, some phases of employment management, planning of efficient kitchens, and selection of equipment.

INDUSTRIAL ORGANIZATION AND MANAGEMENT. (Mechanical Engineering 3235.) Throughout the year. Credit three hours a term. Three lectures a week.

Management of an industrial enterprise; internal organization; effect of type of product, methods of manufacture, size of enterprise, and personnel involved; types of enterprises; plant location; centralization and decentralization trends; diversification and specialization; growth of industry.

PERSONNEL MANAGEMENT. (Mechanical Engineering 3232.) Fall. Credit three hours. Three lectures a week. Prerequisites, Mechanical Engineering 3241 or permission.

Techniques of employee selection and evaluation, job evaluation, training, motivation; personnel department organization and interdepartmental relations.

MATHEMATICS

ANALYTIC GEOMETRY AND CALCULUS. (Arts and Sciences; Mathematics 161.) Fall or spring. Credit three hours. Prerequisite, trigonometry and intermediate algebra. Hours to be arranged.

Plane analytic geometry through conics. Differentiation and integration of polynomials with applications to rates, maxima, volumes, pressures, etc.

Courses 161–162–163 represent a standard three-term calculus sequence, presenting the main ideas and techniques of the calculus and analytic geometry; the material is so arranged that the first two terms (161–162) provide a reasonably complete introduction to the subject. This sequence of courses is not intended as preparatory to more advanced courses in mathematics, although admission to such courses can be obtained following this sequence by special permission. (For students who took the 161–162–163 sequence when it was the only one offered, this will continue to serve as the prerequisite to advanced work.) Students majoring in mathematics or in those physical sciences where mathematics is extensively used or who have special mathematical competence should elect the 181–182–183 sequence instead.

ANALYTIC GEOMETRY AND CALCULUS. (Arts and Sciences; Mathematics 162.) Fall or spring. Credit three hours. Prerequisite, Mathematics 161 or 181. Hours to be arranged.

Differentiation and integration of algebraic, trigonometric, logarithmic, and exponential functions, with applications. Related topics, including polar coordinates, parametric equations, and vectors.

ANALYTIC GEOMETRY AND CALCULUS. (Arts and Sciences; Mathematics 163.) Fall or spring. Credit three hours. Prerequisite, Mathematics 162 or 182. Hours to be arranged.

Infinite series, solid analytic geometry, partial derivatives, and multiple integrals.

*STATISTICAL METHODS I.** (Agriculture; Plant Breeding 210.) Fall. Credit one, three, or four hours. Prerequisite, graduate standing or permission of instructor. T Th S 10. Warren 245. Laboratory to be arranged. Associate Professor STEEL.

The distributions of statistics encountered in biological and other fields are considered from the point of view of elementary probability notions and by sampling from known populations. The results, with principles of experimentation, are applied to the conduct of experiments and interpretation of results. The nature and validity of experimental error are treated. Topics include tests of hypotheses, the simpler experimental designs and their analyses of variance, linear regression and correlation, the treatment of discrete data.

*STATISTICAL METHODS II.** (Agriculture; Plant Breeding 211.) Spring. Credit one, three, or four hours. Prerequisite, Plant Breeding 210 or the equivalent. T Th S 10. Warren 245. Laboratory to be arranged. Associate Professor STEEL.

*An additional hour per week is devoted to algebraic derivations and manipulations associated with the statistical techniques and computational procedures of the lectures and laboratory. The purpose is to give the student a better understanding of statistics and to improve his background for further work in statistics, such as Plant Breeding 213. This additional hour may be taken for one hour credit with or without the regular three hours credit.

The work of Plant Breeding 210 is continued. Topics include factorial experiments, individual degrees of freedom, analysis of covariance, analysis of variance of two-way classifications with disproportionate numbers, multiple and curvilinear regression, curve fitting, some recent developments in statistics.

ECONOMIC AND SOCIAL STATISTICS. (Industrial and Labor Relations 510.) Fall or spring. Credit three hours. Fall. T Th 2. Laboratory W 3:30–5. Professor McCARTHY.

A nonmathematical course for graduate students in the social studies without previous training in statistical method. Emphasis will be placed on discussion of technical aspects of statistical analysis and on initiative in selecting and applying statistical methods to research problems. The subjects ordinarily covered will include analysis of frequency distribution, time series (including index numbers), regression and correlation analysis, and selected topics from the area of statistical inference.

PRINCIPLES OF INDUSTRIAL ACCOUNTING AND COST FINDING. (Engineering 3231.) Fall or spring. Credit three hours. Two recitations and one computing period a week.

Basic course in the principles of industrial accounting including controlling accounts; special journals and ledgers; voucher system; manufacturing cost systems.

PHYSIOLOGY AND HISTOLOGY

PHYSIOLOGY. (Veterinary; Physiology 12.) Spring. Credit three hours. M W F 8. Professor DUKES.

Lectures and demonstrations on blood and lymph, circulation, respiration, digestion, and absorption. The action of drugs (pharmacodynamics) will be considered where possible.

PHYSIOLOGY. (Veterinary; Physiology 13.) Fall. Credit three hours. M T W 9. Professors DUKES, DYE, and DOUGHERTY.

Lectures and demonstrations on the muscular and nervous systems, senses, excretion, metabolism, temperature regulation, endocrine organs, and reproduction. The action of drugs will receive attention where possible.

EXPERIMENTAL PHYSIOLOGY. (Veterinary; Physiology 14.) Fall. Credit three hours. For nonveterinary students registration is by permission. Laboratory, T 10–12:30, F 8–1; or W 10–12:30, S 8–1. Associate Professor NANGERONI and assistants.

Special emphasis is placed on mammalian physiology. A part of the course is devoted to pharmacodynamics.

ADVANCED EXPERIMENTAL PHYSIOLOGY. (Veterinary; Physiology 16.) Spring. Credit two hours. Prerequisites, Physiology 12 or 13 or its equivalent, and Physiology 14 or its equivalent. Registration by permission. Laboratory, F 9–1. Associate Professor NANGERONI and collaborators.

COMPARATIVE PHYSIOLOGY. (Arts and Sciences; Zoology 451.) Fall. Credit four hours. Prerequisites, one year of biology or zoology and college courses in chemistry. Organic chemistry and comparative anatomy are also desirable. Lectures, M W F 9. Laboratory, M T W Th F 1:40–4:50 or S 8:00–11:10. Professor SCHNEIDERMAN.

The principal physiological functions of both vertebrates and invertebrates, including muscle contraction, nerve action, respiration, metabolism, digestion, circulation, excretion, and physiological regulation.

GENERAL AND CELLULAR PHYSIOLOGY. (Arts and Sciences; Zoology 452.) Spring. Credit four hours. Prerequisites, animal or plant physiology, organic chemistry, physics, and permission of the instructor. Biochemistry and histology, genetics or cytology, are also desirable. Enrollment is limited. Lectures, M W 12. Seminar and laboratory, T W or T Th 1:40–5. Professor SCHNEIDERMAN.

An introduction to basic problems and methods of cellular physiology including physicochemical properties of protoplasm, function of cell organelles, role of nucleic acids, virus reproduction, permeability and active transport, growth, respiration, metabolism, and effects of ionizing radiation. The laboratory is designed to familiarize the student with basic techniques currently employed in physiological investigations, notably manometric and spectrophotometric methods, radioactive tracer technique, isolation of intracellular components, identification of enzyme systems, use of ultraviolet and x-irradiation, tissue culture, microsurgery, immunological methods.

FUNDAMENTALS OF ENDOCRINOLOGY. (Agriculture; Animal Husbandry 127.) Fall. Credit three hours. Lectures, T Th 10. Wing C. Laboratory to be arranged. Associate Professor HANSEL.

A general course in the physiology of the endocrine glands, and the roles played by each hormone in the regulation of normal body processes. The laboratory work is designed to illustrate the basic principles of endocrinology and their applications to more efficient production in all classes of livestock.

PHYSIOLOGY OF REPRODUCTION. (Agriculture; Animal Husbandry 125.) Spring. Credit two hours. Open to graduate students and upperclassmen. Prerequisite, a course in human or veterinary physiology. Lectures, M W 10. Wing C. Professor ASDELL.

An advanced course in reproduction, principally in mammals.

ENDOCRINOLOGY AND METABOLISM. (Veterinary; Physiology 305.) Fall. Credit three hours. Prerequisites, six or more hours of biology, and a previous or parallel course in organic chemistry. Open to upperclassmen and graduate students. M W F 8. Professor DYE.

A study of intermediary metabolism, endocrinology, and reproduction. Illustrated lectures.

HISTOLOGY: THE BIOLOGY AND DEVELOPMENT OF THE TISSUES. (Arts and Sciences; Zoology 301.) Fall. Credit four hours. Prerequisites, Zoology 101–102, or 103–104, and 211–212. Lectures, T Th 11. Laboratory, T Th 8–10:30 or 2–4:30. Professor WIMSATT and assistants.

A survey of the structure and development of the tissues. The treatment is general, designed to provide students of biology with a basis for the understanding of normal and abnormal structure of the vertebrates. Each student will make for his own use a series of typical microscopic preparations.

SPECIAL HISTOLOGY: THE BIOLOGY OF THE ORGANS. (Arts and Sciences; Zoology 302.) Spring. Credit four hours. Prerequisite, Zoology 301. Enrollment limited to 25 students. Lectures, W F 9. Laboratory, W F 2–4:30. Professor WIMSATT and assistants.

A continuation of Zoology 301. Zoology 301 and 302 together give the fundamental facts of the microscopic structure and development of the body. There is also offered opportunity to gain knowledge of technique in the fixing, embedding, and sectioning of selected organs.

SOCIAL STUDIES

THE FIELD OF SOCIAL WORK. (Agriculture; Rural Sociology 124.) Fall or spring. Credit three hours. Not open to freshmen or sophomores. Prerequisite, one course in sociology and one course in psychology. Lectures and discussions, M W F 9. Warren 260. Associate Professor TAIETZ.

The field of social work and its services designed to meet a wide range of human needs growing out of social, economic, and emotional maladjustments. An understanding of social work is developed through a study of the processes of social case

work, social group work, and community organization. Consideration is given to social work as a career, the professional knowledge and skill necessary for the practice of social work, and how these can be acquired through training.

PSYCHODYNAMICS OF PERSONALITY. (Home Economics; Child Development and Family Relationships 360.) Spring. Credit three hours. Open to juniors and seniors; graduate students admitted by permission of the instructor. Limited to forty-five students. M W F 11. Van Rensselaer 124. Professor ————.

Psychological influences in the development and functioning of persons. Special attention will be given to basic determinants of personality; structure of the personality; personality in social and cultural context; the influence of conscious and unconscious processes in behavior.

RURAL COMMUNITY ORGANIZATION. (Agriculture; Rural Sociology 111.) Fall. Credit three hours. Prerequisite, Rural Sociology 1 or 12 or permission of the instructor. T Th 11–12:30. Warren 31. Associate Professor REEDER.

A consideration of the problems involved in helping people and organizations in a community work together to meet their common needs. Problems which arise in helping schools, churches, farm organizations, and civic groups in integrating themselves into the life of the community are one part of this consideration. Students are given the opportunity to practice some organization techniques which have been found successful in community organization work.

THE NATURE OF MAN: CULTURE AND PERSONALITY. (Arts and Sciences; Sociology and Anthropology 204.) Spring. Credit three hours. Prerequisites, one of the following: Zoology 201 (or equivalent), a course in psychology (preferably Psychology 203), sociology and anthropology, child development and family relationships, or consent of instructors. M W F 10. Professors HOLMBERG and OPLER.

A study of the individual in his society, emphasizing the relationship between social structure, cultural context, and human behavior. Attention is given largely to the study of personality, "normal" and "abnormal," in non-Western societies.

This is one of three interdepartmental courses dealing with the nature of man from the perspectives of the biological and behavioral sciences. The other courses in the series are Zoology 201 and Psychology 203. These courses may be taken singly or in any order.

[*NATIVE CULTURES OF THE NEW WORLD: NORTH AMERICA.* (Arts and Sciences; Sociology and Anthropology 603.) Fall. Credit three hours. M W F 11. Assistant Professor SMITH. Not offered in 1957–1958.]

[*NATIVE CULTURES OF THE NEW WORLD: MIDDLE AND SOUTH AMERICA.* (Arts and Sciences; Sociology and Anthropology 604.) Spring. Credit three hours. M W F 11. Professor HOLMBERG. Not offered in 1957–1958.]

[*NATIVE CULTURES OF ASIA AND THE PACIFIC: SOUTH ASIA AND OCEANIA.* (Arts and Sciences; Sociology and Anthropology 605.) Fall. Credit three hours. M W F 2. Professor SHARP. Not offered in 1957–1958.]

[*NATIVE CULTURES OF ASIA AND THE PACIFIC: EAST ASIA.* (Arts and Sciences; Sociology and Anthropology, 606.) Spring. Credit three hours. M W F 2. Assistant Professor SMITH. Not offered in 1957–1958.]

CASE STUDIES IN APPLIED ANTHROPOLOGY. (Arts and Sciences; Sociology and Anthropology 420.) Fall. Credit three hours. Prerequisite, consent of instructor. M 7:30–9:30 p.m. Professor HOLMBERG and staff.

Designed for advanced undergraduate or graduate students in engineering, agriculture, nutrition, or the social sciences who are concerned with the modernization

of economically underdeveloped regions of the world. Analysis of selected cases involving technological or other cultural change, of the reactions of participants, and of the validity of general principles of human behavior applied to these situations.

RESEARCH

SPECIAL PROBLEM. (Graduate School of Nutrition 199.) Credit variable. Report on individual problem under direction of any member of the Faculty of the Graduate School of Nutrition. See page 11 for details.